Unit 3: The Microenvironment, Influences on Stem Cell Fate and Cancer

By Darci Kimball, Laurel Barchas and Doug Brownfield

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Suggested time frame:Five to ten class periods

Course level: Advanced Biology, AP/IB level Biology, biotech classes, college level Biology

Inquiry teaching: Read how to modify the curriculum for inquiry teaching

- View Unit 3 Lesson Plans
- Download Unit 3 Teacher Background Information [pdf]
- Download Unit 3 Teacher Glossary [pdf] (refers to terms in Teacher Background Information document)
- Download Unit 3 Student Glossary [pdf]
- Download Unit 3 Bibliography [pdf]
- Download Unit 3 PowerPoint presentation [ppt]
- Go to Introductory Lesson download page

Brief Outline of Unit 3

View detailed unit 3 lessons outline

I. Invitation

A. Animation - immune cells and colony stimulating factors

B. Review genetic processes wih interactive animations and by viewing clips of transcription and translation

C. AP extension activity

1. From Genotype to Phenotypes activity; exploring how stem cells with one genotype give rise to more mature cells with multiple phenotypes?

II. Exploration

A. Cell fate and behavior

1. Lecture - how cell phenotype comes from genotype; transcription and translation; how a cell knows what to become; Central dogma of biology
2. Jigsaw reading activity
3. Wet lab - RNAi fly lab
4. AP extension - cell invasions video, cell behavior

B. Microenvironment and Cancer

1. Lecture and supplementary PowerPoint slides on normal microenvironment
2. Aberrant gene expression and abnormal microenvironment
3. Discussion of readings of varying levels of difficulty

III. Application

A. Lecture on progenitor cells in the mammary gland

1. Role of the microenvironment in normal development and cancer

B. Watch videos of different types of arrays

1. cDNA array animation
2. ELISA animation

C. Read about immunocytochemistry to visualize cells

1. Understand use of fluorescently-tagged antibodies
2. Mammary gland images
3. View CIRM flickr page of immunostained cells

D. View animations on breast stem cells, control of breast stem cells, and origin of breast cancer

E. Prepare short paper summarizing the Microenvironment Array (MEArray) and design a MEArray internet research project

F. Design a MEArray internet research projet to understand a new method to test putative ME factors and how they affect mammary gland progenitor cell behavior

G. AP extension topics

1. The influence of physical forces on cell fate decisions
2. How effects of forces on stem or progenitor cells are tested
3. Cell fate determination research

IV. Assessment

1. Essay questions or exam to test understanding of listed topics
2. AP thought questions or web research project to answer listed questions

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